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PRINCIPAL INVESTIGATOR: Jerald Rumph

CONTRACTING ORGANIZATION: Madigan Army Medical Center
Tacoma, Washington 98431

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Madigan Army Medical Center
Tacoma, Washington 98431

E-Mail:

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DHP RFS
Final Report

VIRTUAL PRIMARY CARE CLINIC
Proposal Number: 1999000231

Jerald WILLIAM Rumph MHA

Abstract

Problems

The problems, or challenges as I prefer to refer to them, can be fairly well encompassed within the concept of complexity. This was an ambitious project from the start, with potential to define an e-health direction for the region. It was perhaps this ambitious nature as well as a myriad of complex technical challenges to overcome that sensitized many personnel and departments. The project required discourse between various departments, each with their own agendas and priorities. It involved coordinating key MAMC Information Management functions, the MHS Information Management function of CHCS, SAIC at multiple levels, and many independent researchers in order to deliver patient care services in new ways, test new technology, and support clinical research. These challenges are in addition to those initially described in the mid-term report of internal project leadership definition.

This project was not only a new technology project, but also an information management systems intensive project. The proposal included both data push and data pull with CHCS. While the technology exists to accomplish both, the business processes that this impacts are significant. Thus, the goal of pushing data directly back into CHCS was sacrificed early on in the project to focus on the challenges of pulling data. This necessitated conversion from the hierarchical Mumps data structure of CHCS into a relational database (SQL2000) in order to present the data to the providers and patients over the Internet. A product used within the VA system, the Mumps Data Extractor, was selected but required modifications and upgrades for full functionality with CHCS. The coordination of this component alone required the interactions of the MHS Clinical Information Technology Program Office (CITPO), SAIC (corporate, DT&E, and on-site), and the MAMC Information Management Division. Probably not unexpectedly, various components of this process have required extensive attention in order to proceed.

Two additional challenges from the information management side were encountered.

First, the requirement to complete the DoD Information Technology Security Certification and Accreditation Process (DITSCAP) System Security Authorization Agreement (SSAA) was determined to apply to this project and to have mandatory compliance for all MAMC systems by August 2001. This process is not a simple one, has not previously been required at MAMC, and has challenged both the project personnel and the MAMC Information Security Office. The second additional challenge has been from the recent series of foreign government active Internet attacks that followed the downing of the aircraft in China. These have heightened overall DoD Internet security procedures, slowed development (which is primarily handled remotely via FTP), and resulted in a double log-in requirement for users of the site.

This project also is delivering health care in new ways for MAMC. As discussed further in the Final Results section, patients are provided secure internet messaging with their providers, results of medical care that were previously only available through direct contact with a provider, health information, and on-line health tools. Providers also have access to new tools with which to interact with their patients and new ways to view health data. The multiple components of these processes exceeded the complexity anticipated when initially proposed. Thus, the project scope is actually a great deal broader than first realized.

Support for research projects, identified as a key deliverable, has been successful; an initial approved proposal with eight subsequent proposals are pending final MRMC approval. This research component contributed its own dimension of complexity to this project. Most of the primary researchers on these proposals are novice researchers, the proposals had to be written without the benefit of a fully functioning site to serve as a model for functionality, and the projects required coordination both within and between departments and specialties. Full site delivery prior to proposal development would have facilitated research proposal development.

Deliverables

1. Functional virtual clinic for primary care patients at Madigan a. Appointing b. PCM Communication c. Results Review d. Health Information e. Personalized Health Tracking f. Secure g. Customizable

2. Data interface with CHCS a. Data pull b. Data push

3. Provider Support a. Patient schedules b. Healthcare Communication c. Triage d. Health status summary

4. Research a. Protocols b. Future

See also attached PDF Project Summary.

Expenditures

	3Q FY 00	4Q FY 00	1Q FY 01	2Q FY 01	
Element of Resource (EOR)	Apr 1 - May 31	Jun 1 - Sep 30	Oct 1 - Dec 31	Jan 1 - Mar 31	TOTALS
Travel 2100	0.00	0.00	0.00	1,200.00	1,200.00
Shipping 2200	0.00	0.00	0.00	0.00	0.00
Rent & Communications 2200	0.00	0.00	0.00	0.00	0.00
Contract for Services 2500	0.00	279,051.00	0.00	0.00	279,051.00
Supplies 2600	0.00	5,000.00	2,572.66	776.53	8,349.19
Equipment 3100	0.00	16,000.00	0.00	0.00	16,000.00
GRAND TOTALS	0.00	300,051.00	2,572.66	1,976.53	304,600.19

Financials

Primary development for the site was through a Firm Fixed Price (FFP) contract with Akimeka (teamed with Pacific Health Solutions, Strategic Reporting Systems, and Microsoft). This $279,051 contract has been modified with respect to delivery dates, primarily related to the challenges encountered with the CHCS data extraction tool and approvals. Cost has remained fixed and the contractor has extended, at no additional cost, the on-site half-time research support/technical assistant for two additional months. This represents an excellent value as initial proposals by other vendors against this projects SOW ranged to upwards of $1,000,000.

The anticipated cost to maintain this system with its delivered functionality is approximately $30,000 per year, which would pay for a half-time research/technical assistant. The funds remaining within the budget at present, approximately $18,000 will be primarily used to extend this support for an additional 7 months.

Final Results

PATIENT SITE: This project has successfully deployed an internet based virtual clinic that supports patient access to care 24 hours per day, seven days per week. The fully functional site automates many time-consuming processes involved in healthcare delivery by enabling and encouraging patients to be active participants in their own treatment. Patient are able to book and review appointments on-line. Patients are now able to communicate with their primary care manager asynchronously allowing for improved communication efficiency for both parties involved. Patients can review their medications, laboratory and radiology results, and other health information provided by their healthcare team. Patients can search for on-line information prior to communicating with their provider via the Healthwise Knowledgebase. This, combined with tools for tracking health behaviors, encourages patients to take an active role in their care. Patients communicate with their team through secure, webpage posting. Patients can customize their own home page to present the information that they want to see when they log-in to the site and to then work with that information in the manner they find most beneficial.

DATA INTERFACE: This project has overcome many challenges from both the technology side and the business process side. It has successfully pulled data from CHCS for presentation to patients and providers. We executed a measured decision not to pursue the data push option having engaged in greater than expected challenges with the data pull. We are able to take the CHCS mumps data and convert it directly to a SQL2000 relational structure for presentation via our secure website.

PROVIDER SUPPORT: The virtual clinic supports providers in their delivery of healthcare as well as the patients. Providers are able to review in one location their patients schedules for the day and with a single mouse click drill down to the individual patient information. The initial patient view offers a summary of health information about the patient and also support extended views. Providers may also view and print the patient's Form 2766. In addition to viewing the patients CHCS data the site also supports the review of patient completed Triage Forms, On-line Questionnaires and Surveys, and Health Status Summaries. Providers can communicate asynchronously with their patients allowing them to convey health information securely without having to repeatedly attempt to call patients.

SCALABILITY: This project has been designed to support up to 20,000 users. One of the indirect outcomes of this project will be an assessment of the level of interest expressed by patients. While a previous study that we conducted here suggested that as many as 60% of users would be interested we are anticipating a potential 25% interest level. The level of interest is not seen as a static measure, however, as we anticipate growing demand as internet usage and comfort continues to grow.

RESEARCH: This project has supported eight formal research protocols. These protocols touch on a range of important clinical and business areas for the AMEDD. Three of the projects focus primarily on business processes. One resident led protocol compares electronic consultation with telephone consultation. This project's hypothesis is that use of the internet for electronic communication (secure messaging) will improve patient and provider satisfaction and decrease demands for office visits as compared to traditional office visits and phone contact. A second, nurse led protocol, explores the concept of Demand Management with the hypotheses that regular electronic communication that includes content reflecting the concern for patient health and health promotion information will decrease medical system utilization frequency for patients

identified as frequent medical system users, that nursing staff can appropriately implement this procedure, and that the workload requirements for nursing staff to implement this process will be more than offset by the decreased medical system utilization by patients. A third project is being conducted jointly with Foundation Health, the Region's TRICARE contractor, comparing the "costs" for electronic appointing versus telephone appointing.

The other protocols have a more clinical focus. One resident led protocol is focused on hypertension with the hypotheses that the use of internet technology to provide personalized patient education and delivery of information between provider and patient will improve blood pressure control when compared with current clinic practice of managing hypertension. Another resident led protocol targets hyperlipidemia with the hypothesis that using Internet technology to provide personalized patient education and delivery of information between provider and patient will improve lipid control to meet the Adult Treatment Panel (ATPII) and National Cholesterol Education Program (NCEP) guidelines for secondary prevention when compared with current clinic practice of managing hyperlipidemia.

Two other protocols are headed up by Nurse Practitioners. The first looks at diabetes control, with the hypothesis that regular contact through electronic communication that includes health promoting content and provides personalized patient education and delivery of information between health care provider and patient will improve glycemic control and positively impact Health Locus of Control, Self- care agency and Health Promoting behaviors in adult patients with Type 2 Diabetes when compared to adult patients with Type 2 Diabetes without access. The second targets chronic pain with the hypothesis that regular electronic communication that includes content reflecting concern for patient health, cognitive behavioral therapy, medication, exercise, lifestyle, complimentary/non- traditional health care and health promotion information will decrease medical system utilization, decrease cost, and improve patient reported pain symptoms compared to a control group receiving standard care.

Finally, psychologists are exploring the use of virtual care for depression and the overall impact of this project (to include research) on clinic functioning. The depression project hypothesizes that regular electronic communication between the primary care provider and patients with depression that includes content reflecting the concern for patient health, supportive psychotherapy, medication, exercise, lifestyle, and health promotion information will decrease medical utilization and cost and improve patient outcomes when compared to a control group receiving standard care, and that primary care providers, to include nurse practitioners and physicians, can appropriately provide this treatment when collaboratively supported by a clinical psychologist. The comprehensive/overview project evaluates the virtual care impact upon primary care business practices as measured by compliance with clinic policies, patient care follow-up, patient education, and workload accounting.

The research protocols outlined above represent only a small number of the possible research opportunities that may ensue as a result of this e-health initiative. The design of this project not only allows research to exist on this platform, but is specifically constructed to support research initiatives. The site allows dynamic creation of new questionnaires and forms that can be completed by patients on-line. The site also supports integrated research study enrollment and participant management.

Projected Costs

This project was developed with the standard that it be able to support 20,000 users. The data pull from CHCS is presently designed for pulling all patient data for all patients supported by this CHCS host, a region that is not the entirety of Region 11, but does include all of MAMC, McChord, Bremerton, Oak Harbor, and other geographically related areas within the Northwest. The cost and complexity for wide scale deployment would presumably require a part-time research/technical assistant at each site to assist both patients and providers in bringing the system to functioning. Following an initial year of that dispersed support the support may be able to be localized to a single support person at MAMC.

Estimated costs for an extended application to other hospitals, clinics, or the Army overall may be in the range of $100,000 per location. Anticipated costs would be license fees and engineering for site customization. Additional features to include amplified data views and documentation that would be desired for an AMEDD wide solution may add up to $300,000.

Comments

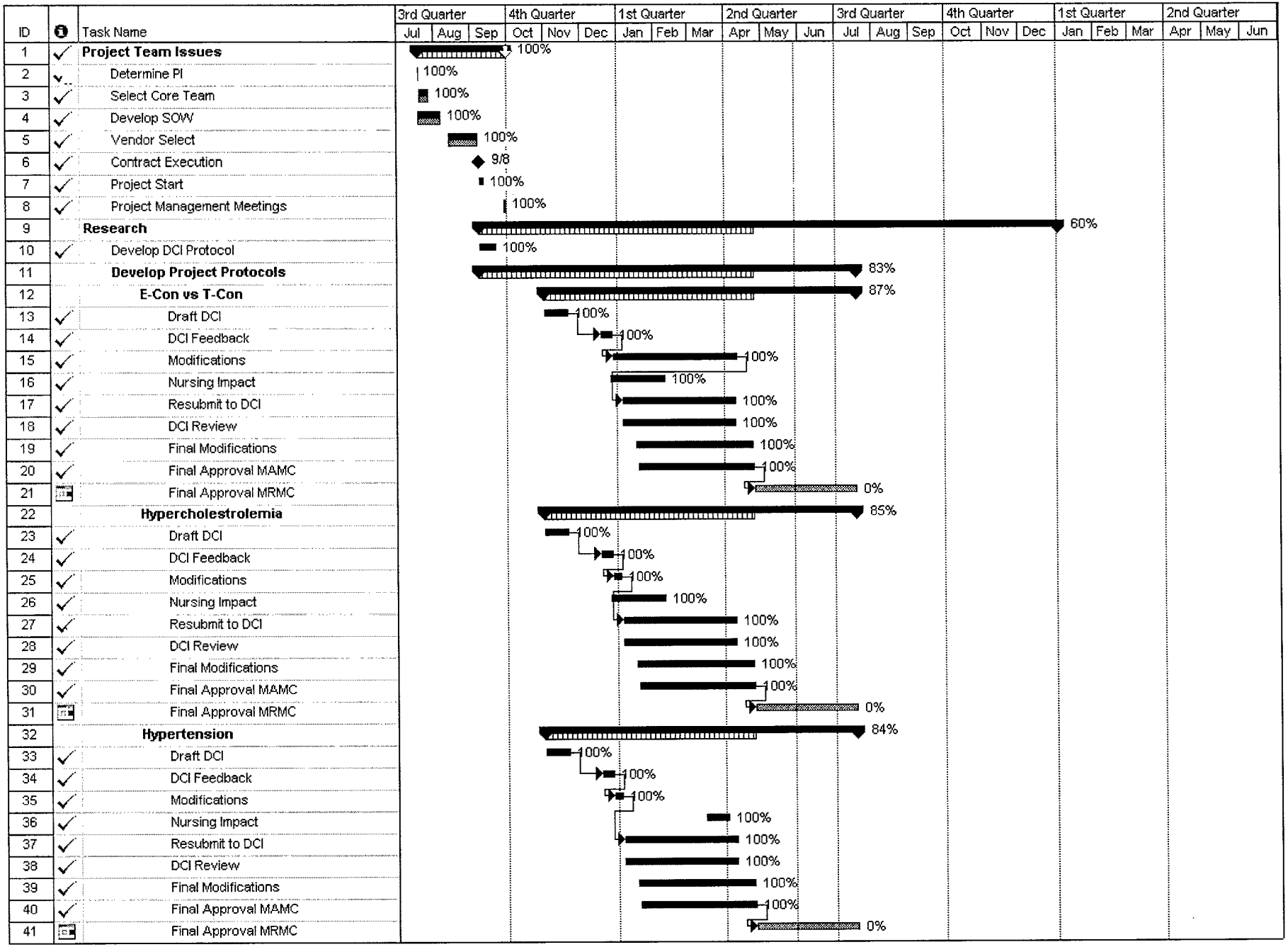
The funding for telemedicine research has offered an opportunity for investigators, such as myself, to pursue areas of exploration that would otherwise not be available. The awarding of funds to the PI to pursue the research has allowed this, and other projects with which I am involved, to proceed without some of the time and process delays associated with "acquisition" projects while maintaining a single responsible individual for the project. It would be optimal if the funding could be made available earlier in the fiscal year, or if it could be dispersed as two-year funding, but this type of issue is not unique to this program.

TATRC Scientific Review

TATRC Acquisition Review

Supporting Graphs/Charts

See Attached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1 Project Team Issues
2 Determine PI
3 Select Core Team
4 Develop SOW
5 Vendor Select
6 Contract Execution
7 Project Start
8 Project Management Meetings
9 Research
10 Develop DCI Protocol
11 Develop Project Protocols
12 E-Con vs T-Con
13 Draft DCI
14 DCI Feedback
15 Modifications
16 Nursing Impact
17 Resubmit to DCI
18 DCI Review
19 Final Modifications
20 Final Approval MAMC
21 Final Approval MRMC
22 Hypercholestrolemia
23 Draft DCI
24 DCI Feedback
25 Modifications
26 Nursing Impact
27 Resubmit to DCI
28 DCI Review
29 Final Modifications
30 Final Approval MAMC
31 Final Approval MRMC
32 Hypertension
33 Draft DCI
34 DCI Feedback
35 Modifications
36 Nursing Impact
37 Resubmit to DCI
38 DCI Review
39 Final Modifications
40 Final Approval MAMC
41 Final Approval MRMC
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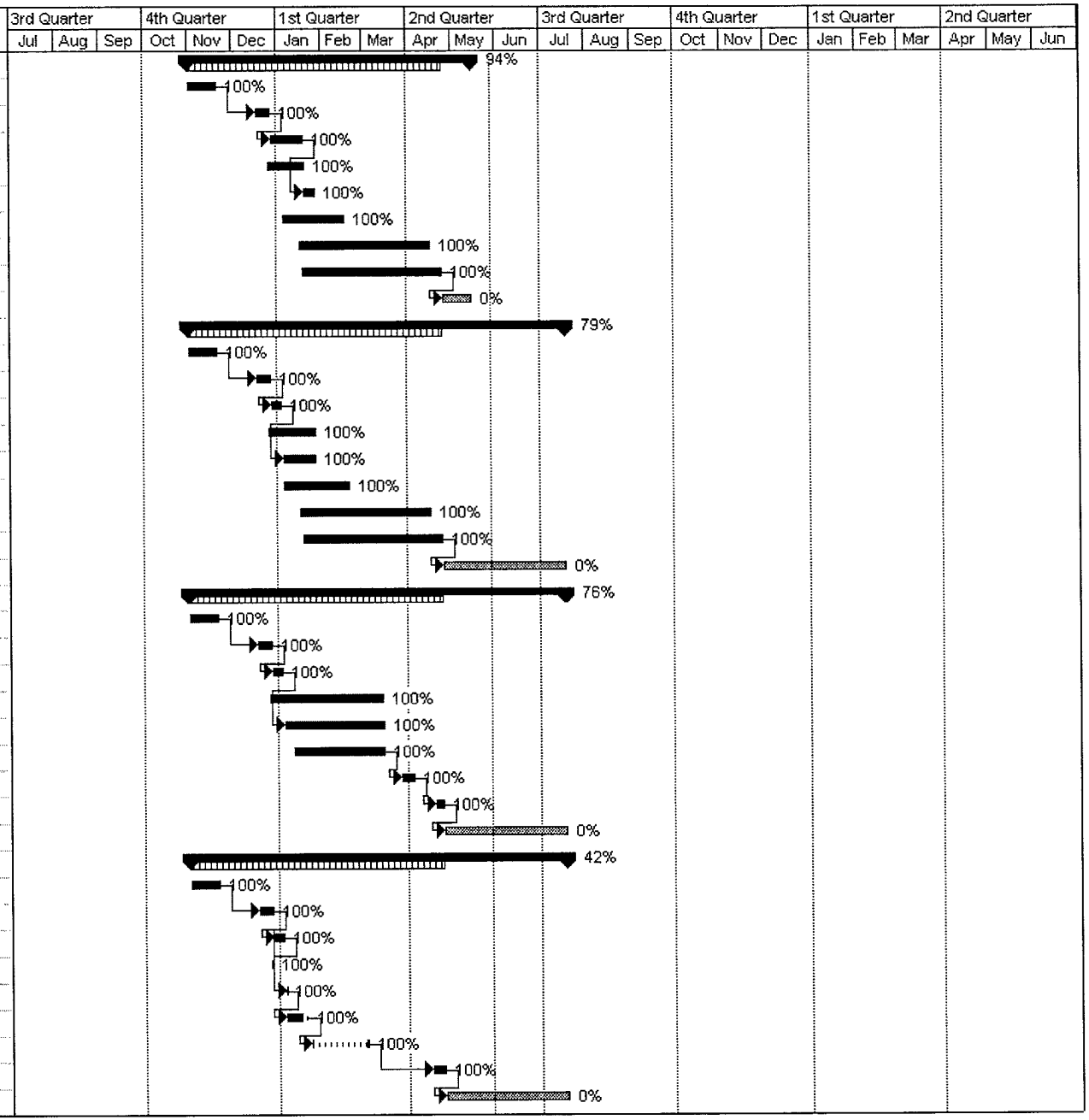
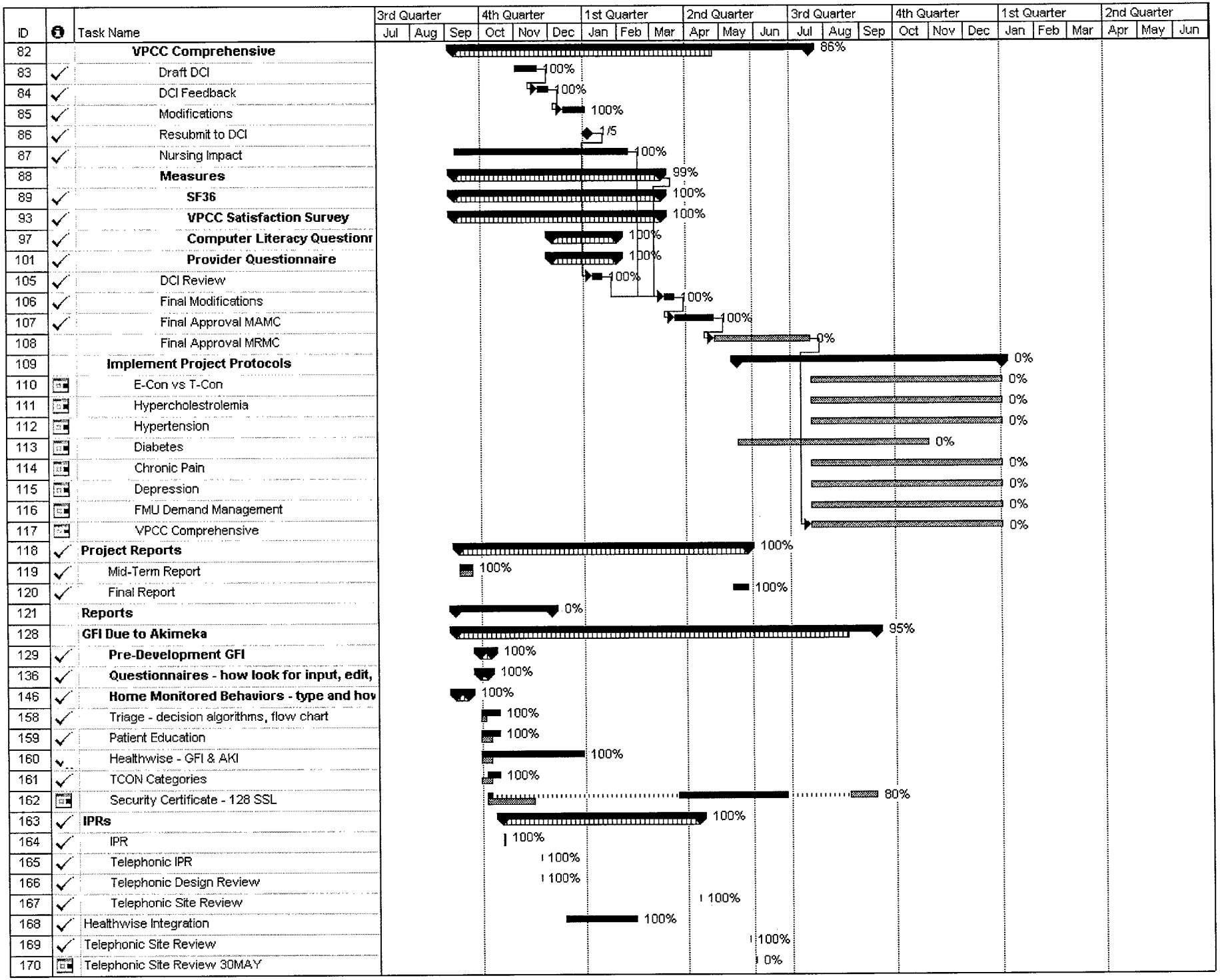
42	**Diabetes**
43	Draft DCI
44	DCI Feedback
45	Modifications
46	Nursing Impact
47	Resubmit to DCI
48	DCI Review
49	Final Modifications
50	Final Approval MAMC
51	Final Approval MRMC
52	**Chronic Pain**
53	Draft DCI
54	DCI Feedback
55	Modifications
56	Nursing Impact
57	Resubmit to DCI
58	DCI Review
59	Final Modifications
60	Final Approval MAMC
61	Final Approval MRMC
62	**Depression**
63	Draft DCI
64	DCI Feedback
65	Modifications
66	Nursing Impact
67	Resubmit to DCI
68	DCI Review
69	Final Modifications
70	Final Approval MAMC
71	Final Approval MRMC
72	**FMU Demand Management**
73	Draft DCI
74	DCI Feedback
75	Modifications
76	Nursing Impact
77	Resubmit to DCI
78	DCI Review
79	Final Modifications
80	Final Approval MAMC
81	Final Approval MRMC

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82 VPCC Comprehensive
83 Draft DCI
84 DCI Feedback
85 Modifications
86 Resubmit to DCI
87 Nursing Impact
88 Measures
89 SF36
93 VPCC Satisfaction Survey
97 Computer Literacy Questionr
101 Provider Questionnaire
105 DCI Review
106 Final Modifications
107 Final Approval MAMC
108 Final Approval MRMC
109 Implement Project Protocols
110 E-Con vs T-Con
111 Hypercholestrolemia
112 Hypertension
113 Diabetes
114 Chronic Pain
115 Depression
116 FMU Demand Management
117 VPCC Comprehensive
118 Project Reports
119 Mid-Term Report
120 Final Report
121 Reports
128 GFI Due to Akimeka
129 Pre-Development GFI
136 Questionnaires - how look for input, edit,
146 Home Monitored Behaviors - type and hov
158 Triage - decision algorithms, flow chart
159 Patient Education
160 Healthwise - GFI & AKI
161 TCON Categories
162 Security Certificate - 128 SSL
163 IPRs
164 IPR
165 Telephonic IPR
166 Telephonic Design Review
167 Telephonic Site Review
168 Healthwise Integration
169 Telephonic Site Review
170 Telephonic Site Review 30MAY
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171		**MDE**	83%
172	✓	MDE Testing (SAIC La Jolla)	100%
173		**MDE Testing MAMC**	66%
174	✓	MDE 1.0 Software Receipt	2/9
175	✓	MDE Installation - Training Database	100%
176	✓	MDE Server Receipt	2/9
177	✓	MDE Download Testing	100%
178	✓	MDE2.0 Implementation	100%
179		MDE 2.1Implementation	6%
180		MDE 2.2 Implementation	0%
181		MDE Approval MAMC	0%
182	✓	MDE Approval CITPO	2/1
183	✓	**CHCS Table/Field Validation**	100%
184	✓	Table Identification	100%
185	✓	Field Identification	100%
186	✓	Field Validation MAMC	100%
187	✓	Field Validation Akimeka	100%
188	✓	**Appointing Process**	100%
189	✓	Foundation Approval	100%
190	✓	MAMC Approval	100%
191	✓	**3.6 Site Design (GUI)**	100%
192	✓	3.6.1. Patient Personal Page	100%
193	✓	3.6.1.1. User Name & Password Login	100%
194	✓	3.6.1.2. Secure Email Communication (Encryptio	100%
195	✓	3.6.1.3. Personalized Welcome Message	100%
196	✓	3.6.1.4. Access Appointment Information	100%
197	✓	3.6.1.4.1. Pending Appointment (Time, Clinic, an	100%
198	✓	3.6.1.4.2. Cancel Appointments	100%
199	✓	3.6.1.4.2. Notify TRAC and/or Clinic of Cancella	100%
200	✓	3.6.1.4.3. Schedule Appointments (PCM or Tean	100%
201	✓	3.6.1.4.4. Provide Appointment/Clinic Instruction	100%
202	✓	3.6.1.4.6. Provide Prompt Based on Scheduled ,	100%
203	✓	3.6.1.4.7. Provide any Questionnaires Needed F	100%
204	✓	3.6.1.5. Prompt for Home Monitored Health Behe	100%
205	✓	3.6.1.6. Prompt for Info Update and Triage	100%
206	✓	3.6.1.7. Access Lab/Radiology Results	100%
207	✓	3.6.1.8. Access Current Medications, Doses, Re	100%
208	✓	3.6.1.9. Notify Patient of Medication Recalls	100%
209	✓	3.6.1.10. Notify Patient of Prescription Ready fo	100%
210	✓	**3.6.2. Triage Functions**	100%
211	✓	3.6.2.1. Prompt for New Information	100%
212	✓	3.6.2.2. Lead Patient Through Decision Alg	100%
213	✓	3.6.2.2.1. Establish Notification System for	100%
214	✓	3.6.2.2.2 Prompt Patient to Complete Templ	100%
215	✓	3.6.2.2.3. Refer Pt to Medical info for Self H	100%
216	✓	3.6.2.2.4. Direct How to Email/Order Prescr	100%
217	✓	3.6.2.2.5. Allow Patient to Email Questions	100%

Timeline: 3rd Quarter (Jul, Aug, Sep), 4th Quarter (Oct, Nov, Dec), 1st Quarter (Jan, Feb, Mar), 2nd Quarter (Apr, May, Jun), 3rd Quarter (Jul, Aug, Sep), 4th Quarter (Oct, Nov, Dec), 1st Quarter (Jan, Feb, Mar), 2nd Quarter (Apr, May, Jun)

ID	Task Name
218	3.6.3. History Questionnaire
219	3.6.4. Clinic Information
220	3.6.5. Hospital Directory-Maps, Parking Recomm
221	3.6.6. TRICARE Link
222	**3.6.7. Patient Education**
223	3.6.7.1. Link to the HealthWise Handbook
224	3.6.7.2. Discharge Education Information (C
225	3.6.7.3. The Primary Care Newsletter
226	3.6.7.4. Nutrition Facts
227	3.6.7.5. Fitness Facts
228	3.6.7.6. Wellness and Prevention
229	3.6.7.7. List Patient Education Classes
230	3.6.7.8. Integrate the Existing MAMC
231	3.6.7.9. Provide Links at Appropriate Locat
232	3.6.8. Employment Opportunities Throughout MA
233	3.6.9. Patient Representative Link-Email Functior
234	**3.6.10. Provider Page**
235	3.6.10.1. Provides Standard Formats and M
236	3.6.10.2. Allows Secure Email Communicat
237	3.6.10.3. Modify and Send Discharge/Treat
238	**3.6.11. User Tracking System (Patient and**
239	3.6.11.1. System to Verify and Measure Us
240	3.6.11.2. Reporting System for Use, Time o
241	**4.0 Legacy System Interface Requirements**
242	4.1. CHCS Research
243	**4.2. Data Pull Required From CHCS**
244	4.2.1. Appointment Data-Pending
245	4.2.2. Appointment Data-Open Appointmen
246	4.2.3. Medications-Current
247	4.2.4. Medication - Past
248	4.2.5. Laboratory Results - Current
249	4.2.6. Laboratory Results - Past
250	4.2.7. Radiology Results
251	4.2.8. Master Problem List
252	4.2.9. Allergies
253	**4.3. Data Push (Modified to Work Arounds**
262	**DITSCAP**
263	Development System Approval
264	Initial Approval to Operate
265	Final SSAA
266	Testing/Integration
267	Post Deployment Support
268	Official Kick-off